

4th Jagiellonian Symposium on Advances in Particle Physics and Medicine



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Invited talk: Alpha and cluster decay of thermally excited nuclei

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The unprecedented observational data from compact object mergers in recent years have confirmed that the nucleosynthesis of heavy and super heavy nuclei can be considered to proceed via the rapid neutron capture or r-process. The r-process nucleosynthesis path is along highly unstable, exotic, and neutron-rich nuclei. Thus, it is not only the photo-dissociation and neutron capture cross sections but also fission (spontaneous and induced) and the decay rates which are important for the abundance evolution.

The explosive conditions in supernovae and neutron star mergers leading to considerably high temperatures could result in nuclei existing in excited states. Though the thermal excitations of nuclei are usually taken into account in the production reactions and their reverse reaction rates entering the network calculations, the alpha decay rates are taken to be those corresponding to the terrestrial decays of ground state nuclei.

In this talk, we shall discuss the effects of thermal excitations on the half-lives of heavy nuclei which decay by emitting an alpha particle (4He) or light clusters such as ^{14}C , ^{20}O , ^{28}Mg etc.

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